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GB 2046584 A GB 0821493 A GB 0797748 A

(58) Field of Search  
UK CL (Edition N ) A4C  
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(54) Incrementally rotational reciprocating member.

(57) The means comprising a housing member, within which are formed a series of grooves which receive at least one groove follower mounted on an actuating member, the actuating member being spring biased; wherein the actuating member is movable from a first position within the housing member to a second position within the housing member along a first undeviating pathway, but on its return from the second position is caused by diversion means, positioned at least in part in the first pathway, to follow a second pathway to a third position adjacent the first position, at least a portion of which second pathway is at an acute angle to the first pathway such that the next time the actuating member moves, it moves from the third position to a fourth position adjacent the second position along a third pathway parallel to the first pathway.

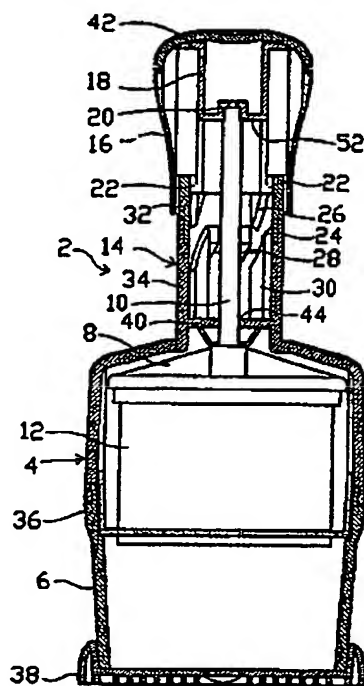


Fig 1

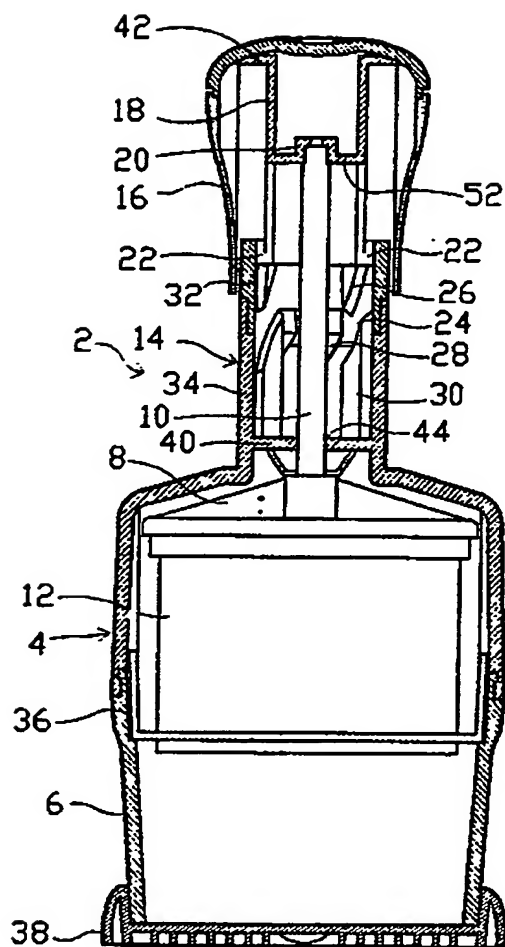


Fig 1

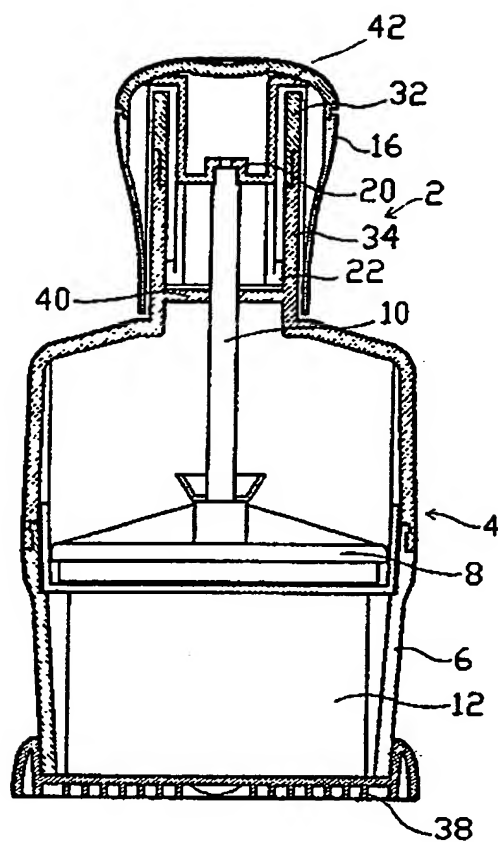
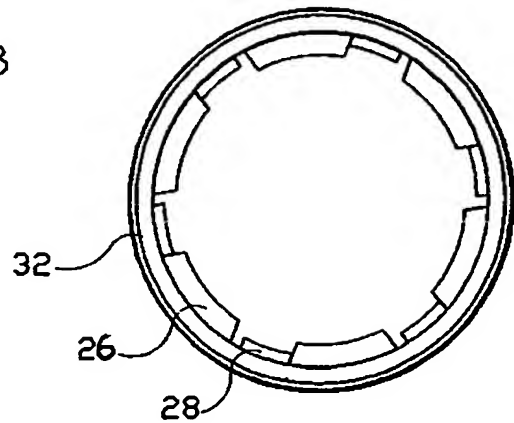
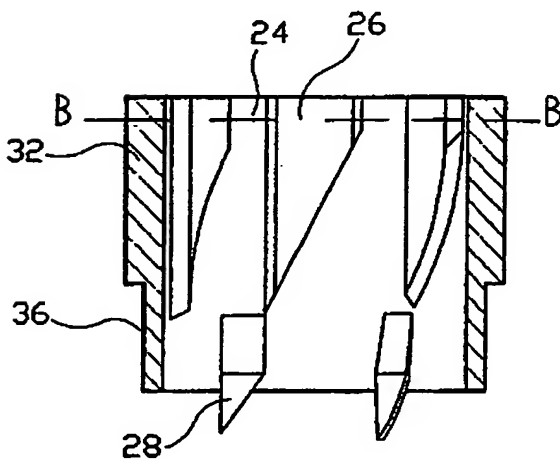
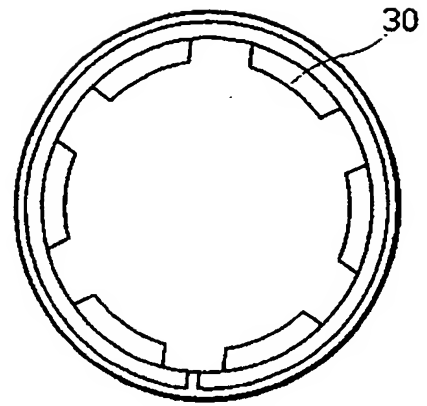
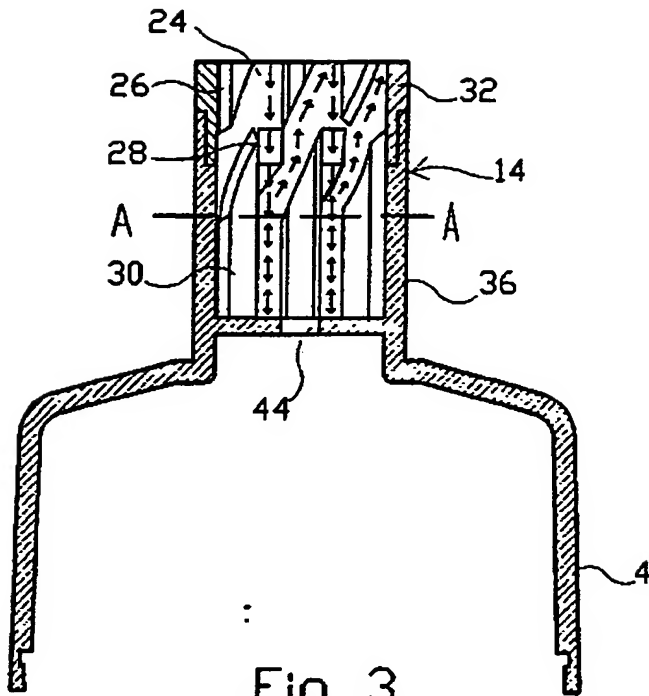


Fig 2



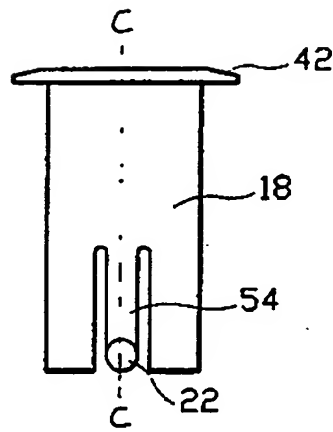


Fig 7

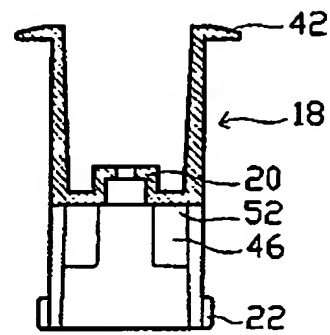


Fig 8

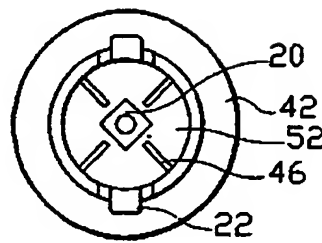


Fig 9

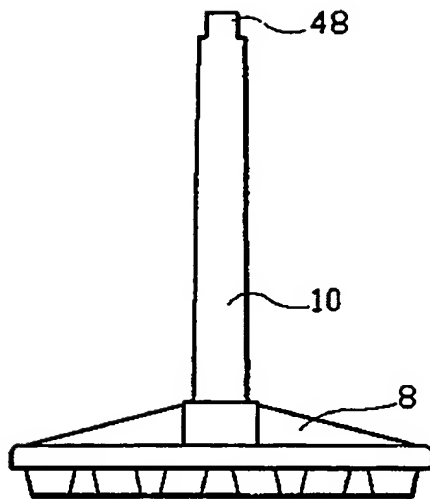


Fig 10

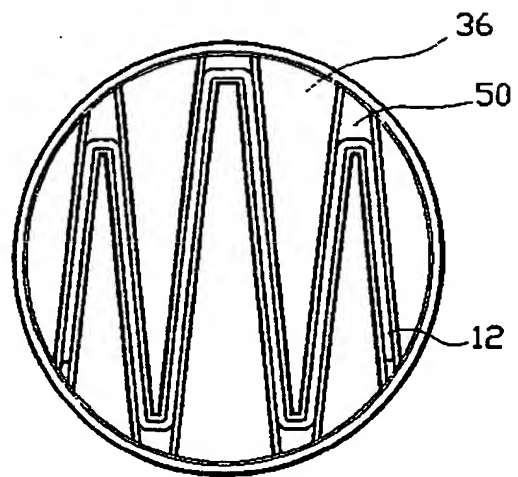


Fig 11

## CHOPPING APPARATUS

5                   This invention relates to a chopping apparatus.

                  In particular, this invention relates to a chopping apparatus  
in which the item to be chopped is contained during chopping and is  
chopped by a blade which rotates incrementally.

                  Known chopping apparatus of this type have the  
10       disadvantages of being difficult to push down to chop; having an unreliable  
turning mechanism - that is, not always turning around; or are difficult or  
complicated and therefore expensive to manufacture.

                  An object of the present invention is to overcome the above  
difficulties or disadvantages or at least to provide the public with a useful  
15       choice.

                  Accordingly, this invention consists in an incremental  
rotational movement means comprising a cylindrical member having  
formed on its inner surface a series of protrusions forming a series of  
grooves which receive a groove follower mounted on an actuating member;  
20       and a spring mounted to be supported by a base in the cylinder at one end  
and by a spring receiving member in the actuating member at the other  
end; wherein, the actuating member is moveable from a first position  
within the neck to a second position within the neck along a first  
substantially vertical pathway, but on its return to the first position from  
25       the second position is caused by the protrusions to follow a second  
pathway, the beginning of which corresponds with the first pathway, but  
at least a portion of the remainder of which is at an acute angle to the first

pathway such that the next time the actuating member moves from the first to the second position, it travels a third pathway, substantially parallel to the first pathway.

Preferred embodiments of the invention will now be  
5 described with reference to the accompanying drawings in which :

- Figure 1 is a transverse sectional view of a preferred embodiment of a chopping apparatus of the invention in a first position.
- 10 Figure 2 is a transverse sectional view of a preferred embodiment of a chopping apparatus of the invention in a second position.
- Figure 3 is a transverse sectional view of a preferred groove arrangement in the neck of the apparatus of the invention.
- 15 Figure 4 is a cross-section through line A-A of figure 3.
- Figure 5 is a transverse sectional view of a top portion of the neck of figure 3.
- 20 Figure 6 is a cross-section through line B-B of figure 5.

Figure 7 is a side view of an actuating member for use in the chopping apparatus of the invention.

Figure 8 is a cross-section through line C-C of figure 7.

Figure 9 is a underneath view of the actuating member of figure 7.

Figure 10 is a side view of a blade support member of the chopping apparatus of the invention.

Figure 11 is an underneath view of a blade guard, having a blade in place, of the chopping apparatus of the invention.

Referring to figures 1 and 2, the chopping apparatus of the invention comprises a casing 4 incorporating a neck 14; preferably formed for ease of assembly in two halves 32, 34; and a vegetable or such like retaining member 6. Within the casing 4 is situated a blade 12 attached to a blade support 8 having a stem 10. The casing 4 further comprises a spring support 40 which supports a spring (not shown) situated with the stem 10 along its central axis; and a separate cap member 16 is also provided again for ease of assembly.

Within the cap 16 is an actuating member 18 (best illustrated in figures 7-9) with a stem receiving recess 20 which receives the tip 48 (see figure 10) of the stem 10. The tip 48 and recess 20 are of cooperating

configurations. The spring (not shown) abuts the base 52 of the actuating member 18 and is thus held in place between the spring support 40, the base 52 and the stem 10. The spring is preferably further supported by splines 46 on the inside of actuating member 18. Actuating member 18 is also provided with an annular lip 42 which supports the cap 16.

On the neck 14 of the casing 4 are a series of protrusions 26, 28, 30 positioned so as to form a series of grooves 24.

The actuating member 18 is provided with protrusions, or groove followers 22 which can be engaged in the grooves 24.

To remove food stuck to the blade 12, the apparatus 2 is also preferably provided with a blade guard shown in figure 11, having a series of slots 50 corresponding to the shape of the blade or blades 12. The blade 12 is preferably formed in one piece in a Zig-Zag shape.

A base cover 38 may be provided to conveniently contain any chopped food.

Base cover 38, blade cover 6 and blade guard 36 are preferably removable to aid in cleaning the chopping apparatus.

Referring now to figures 3-6 which detail the inner face of neck 14, preferably provided are three different types of protrusions arranged in vertical alignment, but not necessary evenly spaced, around the inner face of the neck 14. Protrusions 26 extend downwardly from the top of the neck 14 and taper along one edge, being the same edge in each protrusion 26. Protrusions 30 extend upwardly from the base of the neck 14 and again taper along one side, that side being the opposite side to the



side on which protrusions 26 taper.

Protrusions 26 and 30 are arranged such that their tips are spaced apart laterally a distance sufficient to fit groove follower 22 between them.

5                   This space is filled by a protrusion 28 which is formed in two different shaped halves, the first or upper half is shaped rather like a ski-jump in that it slopes from a point level with groove 24 to a point level with the height of protrusions 26, 30. The second or bottom half of protrusion 28 is of even thickness, that thickness being substantially the  
10                   same as the thickness of protrusions 26, 30 and is tapered on one side, that side being the same side on which protrusions 26 taper.

                  Figure 3 shows the path of a groove follower in the grooves 24 of the neck 14. To actuate the chopping apparatus it is necessary to exert a downwards force on the cap 16. Protrusions 28 are formed such  
15                   that such a downwards force is sufficient to force the groove followers 22 to move in a substantially straight line from the top to the bottom of the neck and to slide over protrusions 28, which movement is assisted by the ramp-like shape of the upper half of protrusions 28. To enable this type of movement it is necessary that the groove followers and/or the arms 52  
20                   to which they are connected be resilient. Alternatively the protrusion 28 could be resilient.

                  As the groove followers return to the top of the neck, under the force of the spring, they are prevented from passing over protrusions 28 by the configuration of its lower half. Instead they are guided onto a

path which is at an acute angle to the path they descended on. This is because the second half of the protrusions 28 is not ramp like, and the force of the spring is insufficient to force the groove followers over the second half of protrusions 28.

5                   As the actuating member 18 is connected via stem 10 and blade support 8 to blade 12, the path which the guide followers 22 are forced to take on their ascent up the neck 14 causes the actuating member to spin around an angle equal to the angle the ascending groove makes with the vertical pathway, which in turn, turns the stem 10, blade support 8 and  
10 blade 12 around by a similar angle. Suitable angles are between 20° and 80° but any angle not 180° or 360° would be suitable. An angle of 60° is preferred.

                  When a downwards force is again exerted on the actuating member 16, it will again follow a vertical line to the base of the neck 14,  
15 but as its starting position is now different that of its previous descent, it now descends down a different line, or pathway, from its previous descent.

                  This action causes the blade 12, each successive time it chops through the food within the blade cover 6, to be in a position different to its preceding position relative to the food. Successive chopping  
20 motions, ie. downward forces on cap 16 and actuating member 18, result in the food being chopped into ever finer pieces.

                  This apparatus is particularly suitable for use with onions which can be contained in the blade cover 6 while being chopped, thus preventing the onion fumes from stinging the eyes, whilst still resulting in

an either coarsley or finely chopped onion as desired.

The above describes a preferred embodiment of a chopping apparatus according to the invention, variations and modifications in which may be made without departing from the scope of the invention as defined  
5 in the accompanying claims.

For example, the protrusion 28 may be facing in an opposite direction such that the actuating member turns on the downstroke and moves in a straight line on the upstroke.

The groove arrangement shown may be utilised in any device  
10 where such incremental rotational movement is desired.

**CLAIMS :**

1. An incremental rotational movement means comprising a housing member, within which are formed a series of grooves which receive at least one groove follower mounted on an actuating member, the actuating member being spring biased; wherein the actuating member is movable from a first position within the housing member to a second position within the housing member along a first undeviating pathway, but on its return from the second position is caused by diversion means, positioned at least in part in the first pathway, to follow a second pathway to a third position adjacent the first position, at least a portion of which second pathway is at an acute angle to the first pathway such that the next time the actuating member moves, it moves from the third position to a fourth position adjacent the second position along a third pathway parallel to the first pathway.
2. An incremental rotational movement means as claimed in claim 1, wherein the at least one groove follower is moved over a diversion means when travelling through the first pathway or other pathways parallel to the first pathway.
3. An incremental rotational movement means as claimed in claim 1, wherein the at least one groove follower is moved through a diversion means when travelling through the first pathway or other pathways parallel to the first pathway.

4. An incremental rotational movement means as claimed in claim 1, wherein at the least one groove follower is moved past a diversion means when travelling through the first pathway or other pathways parallel to the first pathway.

5 5. An incremental rotational movement means as claimed in any one of claims 1-4, wherein the diversion means prevents the at least one groove follower from returning to the same position from which it came.

6. An incremental rotational movement means as claimed in any one of claims 1-5, wherein the series of grooves are formed by a series of  
10 protrusions extending from the inner surface of the housing member.

7. An incremental rotational movement means as claimed in any one of claims 1-6, wherein the undeviating pathways are vertical.

8. An incremental rotational movement means as claimed in any one of claims 1-7, wherein the incremental rotational movement means forms  
15 part of a chopping apparatus.

9. A chopping apparatus comprising a blade, a blade support member connected to an actuating member of an incremental rotational movement means as claimed in any one of claims 1-8, wherein when the at least one groove follower of the actuating member follows the second pathway, the  
20 actuating member turns the blade member and the blade through an angle corresponding to the angle that at least a portion of the second pathway forms with the first pathway.

10. An incremental rotational movement means substantially as herein described with reference to the accompanying drawings.

11. A chopping apparatus substantially as herein described with reference to the accompanying drawings.

-11-

**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(The Search report)**

Application number  
 GB 9402288.6

**Relevant Technical Fields**

- (i) UK Cl (Ed.N)     A4C  
 (ii) Int Cl (Ed.6)     B02C

Search Examiner  
 R B LUCK

Date of completion of Search  
 5 JUNE 1995

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
 1-11

(ii)

**Categories of documents**

- |  |   |
|--|---|
| <p><b>X:</b> Document indicating lack of novelty or of inventive step.</p> <p><b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p><b>A:</b> Document indicating technological background and/or state of the art.</p> | <p><b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.</p> <p><b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p><b>&amp;:</b> Member of the same patent family; corresponding document.</p> |
|--|---|

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2046584	(IBIFHEIT INT)	1 at least
X	GB 821493	(POPEIL S.J.)	1 at least
X	GB 797748	(POPEIL S.J.)	1 at least

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